



AccuPiXEL Series Camera-Control Software

Installation and Operation Manual

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WARNING

Changes or modifications to this unit not expressly approved by the party responsible for FCC compliance could void the user's authority to operate the equipment.

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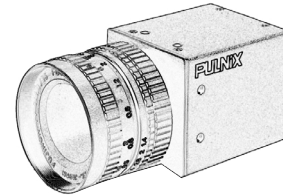


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AccuPiXEL Series Camera-Control Software

PRELIMINARY Operation Manual



TM-1020-15, TM-1020-25, TM-1020-30, and CL versions
TM-1320-15, TM-1320-24, TM-1320-12, and CL versions
TM-2016-8, TM-2016-15, and CL versions
TM-6760 and TM-6760CL
TM-2020-8, TM-2020-15, and CL versions

I Introduction

The AccuPiXEL series cameras are high resolution, progressive scan cameras with PULNiX-proprietary LUT control and other excellent features. The camera control software was developed to function as standard software for the entire AccuPiXEL series. This software can open either the RS-232 serial port (COM) or Camera Link. Camera Link users must physically install the Camera Link frame grabber board into the PC. They must also install the Camera Link API (clserXXX.dll) software. These cameras are specially designed to capture images in progressive scan (non-interlace) format, producing a full frame of electronic shutter images, as well as normal images.

I.1 Software Installation

Following are instructions to install the AccuPiXEL series camera-control software on a PC.

I.1.1 Before Installing the AccuPiXEL Series Camera-Control Software

Before installing the AccuPiXEL series Camera-Control Software, please note the following.

- The AccuPiXEL series camera-control software requires Microsoft Windows 95, 98, NT 4.0., or Windows 2000.
- We recommend that you use small fonts for the Display Properties dialog box in the control panel.
- The AccuPiXEL series camera-control software requires one free communication port that is not in conflict with other peripherals such as the mouse or modem.
- Installation of the AccuPiXEL series camera-control software requires 2.0 MB of free space in your PC hard disk.

I.1.2 Installing the Software

To install the AccuPiXEL series camera-control software, follow the steps below.

1. Insert the installation diskette into the floppy drive of your PC and run “Setup.exe.”
2. The installer will direct you to install the application code.
3. Follow the installer instructions.

Note: You can change the installation directory if you want.

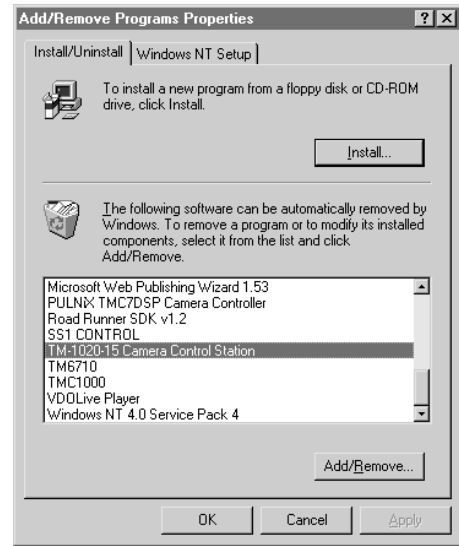
1.1.3 Installing the Camera Link API DLL (clserXXX.dll)

To install the Camera Link control software with frame grabber software, please consult the frame grabber company or PULNiX.

1.1.4 Uninstalling the Software

You can uninstall the AccuPiXEL series camera-control software from the control panel. To uninstall, follow the steps below.

1. Open “Add/Remove Programs” in the control panel.
2. Select “TM-1020 Camera Control Station” from the lists of the installed software.
3. Click the “Add/Remove” button, then click “Yes” to confirm.



2 Graphical User Interface

2.1 GUI Features

The following is a list of camera functions that can be controlled by PC serial commands. The AccuPiXEL series Camera Link cameras use differential serial communication through the Camera Link connector on the rear panel of the camera.

- Shutter Mode and Speed
- Scan Mode (Normal, Binning)
- Gain
- LUT (Look-Up Table)
- Double Knee Control
- Write / Read settings into / from the EEPROM

2.2 Open the Link to the Camera

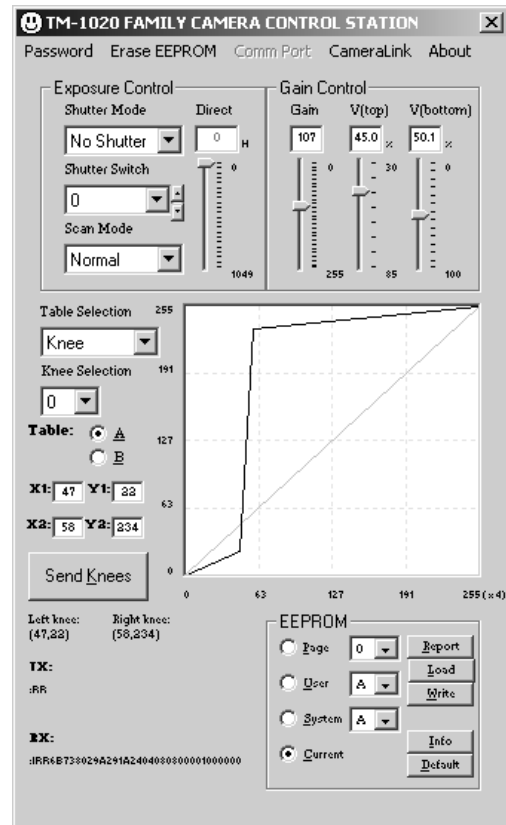
For the RS-232 serial port, refer to “Open RS-232 Port”, below. For Camera Link, refer to “Open Camera Link” below.

2.2.1 Open RS-232 Port

From the main menu tab, select “Comm Port” and click “Open.” Select the port number, and set 9600 bps, no parity, 8 data bits, 1 stop bit, and click “Done.” Click on the “Report” button and the software updates the current settings onto the main control panel.

2.2.2 Open Camera Link

Select frame grabber board index. This index is for users who install multiple Camera Link frame grabbers. For a single board user, the index is selected as zero as default. Once the board index is set, open Camera Link. Choose the appropriate Camera Link API dll (typically named “clserXXX.dll”) which is provided by the frame grabber manufacturer. If the board is not installed or the wrong API dll is selected, an error message appears. If this happens, please contact PULNiX for further assistance. Click the “Report” button to reflect the current settings onto the main control panel.



2.3 Operating The Control Software

2.3.1 Exposure Control

In Exposure Control, you can specify the shutter mode and scan mode.

2.3.1 (a) Shutter Mode

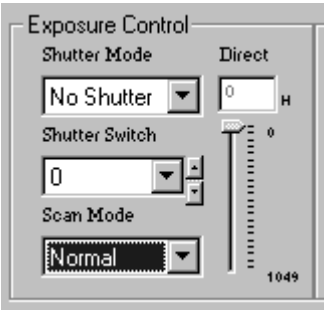
In this list box you can select Manual or Asynchronous or Direct shutter or no shutter mode.

2.3.1 (b) Shutter Time

The Shutter Time list box allows you to select the specific shutter speed.

2.3.1 (c) Scan Mode

The AccuPiXEL series cameras have several selectable scan modes. The Scan Mode list box allows you to select scan mode (Normal, Binning).



2.3.2 Gain Control

2.3.2 (a) Gain

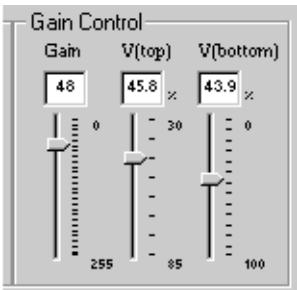
The Gain Control box allows you to change the Gain value from 0 to 255 (integer). To change the value, move the slider, or enter the value directly into the text box.

2.3.2 (b) V-Top

The V(top) box allows you to change the V(top) value of the A/D converter from 30% to 85% (integer). To change the value, move the slider or enter the value directly into the text box.

2.3.2 (c) V-Bottom

The V(bottom) box allows you to change the V(bottom) value of the A/D converter from 0 to 100% (integer). To change the value, move the slider or enter the value directly into the text box.



2.3.3 Knee Control

The Knee Control box allows you to set your own knee value to each LUT. For more detail regarding knee control, please refer to the appropriate hardware operation manual or datasheet.

2.3.3 (a) LUT (Look-Up Table) Selection

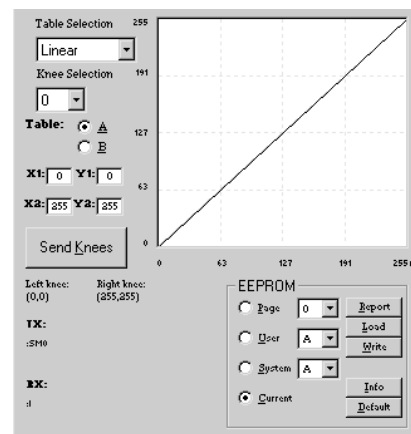
The LUT Selection box allows you to select the linear, knee, or gamma 0.45 output.

2.3.3 (b) Knee Selection

The Knee Selection box allows you to select the preset knee control LUT. The AccuPiXEL series cameras have 8 preset knee control LUTs.

2.3.3 (c) Knee Control

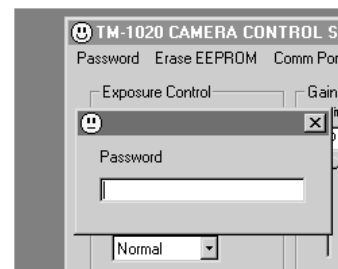
The Knee Control graphical control allows you to change two knee point values visually by clicking and dragging the “knee line.” You may enter X_1 , Y_1 , X_2 , Y_2 values directly to adjust the knee curve. When you have chosen the value you want and are ready to set this value to the camera, click the “Send Knees” button.



2.3.4 “Password” Menu

2.3.4 (a) Password

Please contact PULNiX for password access. The password allows access to the EEPROM to rewrite or erase factory settings.



2.3.5 “Erase EEPROM” Menu

2.3.5 (a) Load Setting From the EEPROM

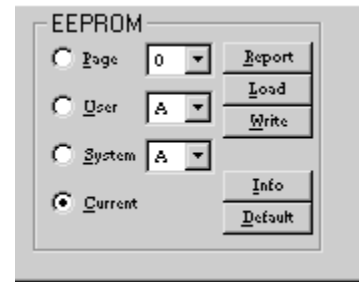
The EEPROM section consists of three memory locations that allow you to Load (open), Write (save) and Report the current configuration.

“Page Memory” has seven pages available to write current configurations. Page “0” is the factory default configuration and cannot be edited without a password. Page memory “1” is power up default. This page will allow you to save your default configuration to load at power up. Page memory will allow you to save the current Exposure Control, Knee, Gain, Vtop, and Vbtlm settings.

“User Memory” will allow you to load, write, and report the current configuration for Gain, Vtop, and Vbtlm only.

“System Memory” is the same as “User Memory” except that it requires a password for access. “Current Memory” is the camera’s current configuration. Select “Current” and click the “Report” button to display the cameras settings.

The “Load” option in the menu bar allows you to restore the Gain Table setting from EEPROM. Click on “Load” and select “From Gain Table” in the menu to restore the setting from four user memory pages and four preset setting memory pages.



3 AccuPiXEL Series Camera Serial Commands

The AccuPiXEL series cameras can be controlled by serial command either via RS-232 or Camera Link. The Start character is always “:” and the End character is always <CR> (return). For example, to set Asynchronous Pulse Width Mode, send the command :SA9<CR> to the camera. The following table contains serial commands that can be used to control the camera.

TABLE 1. Serial Command List

	First Character	Second Character	Third Character	Response	Functions
1	“S” (Shutter)	“M” (Manual)	“0” - “9” Mode	ACK	Manual Shutter Mode
		“A” (ASYNC)	“0” - “8” Mode	ACK	Async Shutter Mode
			“9” (Pulse Width Mode)	ACK	Async Pulse Width Mode
		“X”	“000” - “419”	ACK	Direct Shutter Mode
2	“G” (Gain)	“M”	“00” - “FF”	ACK	Gain Control
3	“V” (A/D Vref)	“T” (Top)	“00” - “FF”	ACK	Vtop reference setting
		“B” (Bottom)	“00” - “FF”	ACK	Vbtm reference setting
4	“W” (Write)	“P” (Page)	“0” - “6”	ACK	Write current setting to Page EEPROM
		“U” (User)	“A” - “D”	ACK	Write current setting to User EEPROM
		“S” (System)	“A” - “D”	ACK	Write current setting to System EEPROM
5	“L”	“P” (Page)	“0” - “6”	ACK	Restore setting from Page EEPROM
		“U” (User)	“A” - “D”	ACK	Restore setting from User EEPROM
		“S” (System)	“A” - “D”	ACK	Restore setting from System EEPROM
		“N” (kNee)	“0” - “9”	ACK	Load Preset Knee Table
6	“R” (Report)	“P” (Page)	“0” - “6”	ACK	ACK + “P” + (“9” - “F”) + 16 bytes
		“U” (User)	“A” - “D”	ACK	ACK + “U” + (“A” - “D”) + 6 bytes
		“S” (System)	“A” - “D”	ACK	ACK + “S” + (“A” - “D”) + (6 bytes)
		“R” (Current)		ACK	ACK + “RR” + 16 bytes
		“X” (Execute)		ACK	Set Camera with loaded data
		“D” (Date)		info	Report CPU program version

TABLE 1. Serial Command List (Continued)

	First Character	Second Character	Third Character	Response	Functions
7	“T” (Table)	“N” (kNee)	X1 + Y1 + X2 + Y2	ACK	(X1, Y1) coordinate for knee 1 X1, Y1, X2, Y2: “00 - FF” (X2, Y2) coordinate for knee 2
		“M” (Gamma)		ACK	
		“L” (Linear)		ACK	
		“C” (Switch A, B Table)	“0” or “1”	ACK	
8	“N”	“0” (Normal)		ACK	Normal Scan Formal
		“3” (Binning)		ACK	Double Speed Binning

Note: One byte of data consists of two ASCII codes. For example, 0x3A is “3” (0 x 33) and “A” (0 x 41). <ACK> is 0 x 06. <NAK> is 0 x 15. <CR> is 0 x 0D.

Note: 1-byte data is represented in 2 ASCII characters, e.g. 0x3A is “3A” or 0x3341.

<CR> = 0x0D Command or response terminator

<ACK> = 0x06 Command accepted

<NAK> = 0x15 Command not accepted

RS Command: RR<CR>

RS Return: RR + “16 bytes” + <CR>

TABLE 2. 16 Bytes Status Report

Byte 1	MGCL (1 byte)	--	CDS Gain
Byte 2	Vtop(1 byte)	--	A/D reference voltage Top
Byte 3	Vbtm(1 byte)	--	A/D reference voltage Bottom
Byte 4	XA1 (1 byte)	--	X-Coordinate of right knee for table A
Byte 5	YA1 (1 byte)	--	Y-Coordinate of right knee for table A
Byte 6	XA2 (1 byte)	--	X-Coordinate of right knee for table A
Byte 7	YA2 (1 byte)	--	Y-Coordinate of right knee for table A
Byte 8	XB1	--	X-Coordinate of left knee for table B
Byte 9	YB1	--	Y-Coordinate of left knee for table B
Byte 10	XB2	--	X-Coordinate of left knee for table B
Byte 11	YB2	--	Y-Coordinate of left knee for table B

TABLE 2. 16 Bytes Status Report (Continued)

Byte 12	FUNCFLAG1 (1 byte)	--	function flag #1
Byte 13	FUNCFLAG2 (1 byte)	--	function flag #2
Byte 14	SHTRNUM (1 byte)	--	current shutter number
Byte 15, 16	SHTRVAL (2 byte)	--	manual/direct shutter value

TABLE 3. Function Flag Description 1

BIT	7	6	5	4	3	2	1	0
FUNCFLAG #1	Resv	Resv	Resv	Resv	SHTR2FLG	SHTR1FLG	MSEL2FLG	MSEL1FLG

SHTR2FLG (Bit3) -- 00 - (0) no shutter, 01 - (1) normal shutter

SHTR1FLG (Bit2) -- 10 - (2) direct shutter, 11 - (3) async shutter

MSEL2FLG (Bit1) -- 00 - (0) normal scan, 01 - (1) partial scan #1 (optional)

MSEL1FLG (Bit0) -- 10 - (0) normal scan, #2 (optional), 11 - (3) two-row scan

TABLE 4. Function Flag Description 2

BIT	7	6	5	4	3	2	1	0
FUNCFLAG #2				TSELF LG	LUTB2FLG	LUTB1FLG	LUTA2FLG	LUTA1FLG

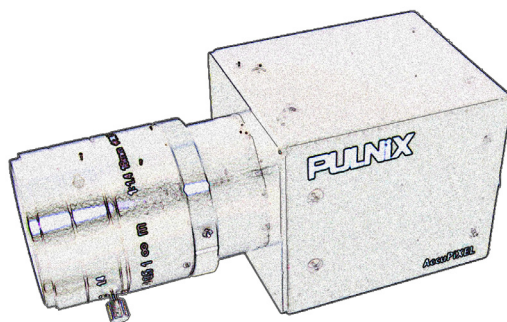
TSELF LG (Bit4) -- 0 - Select table A, 1 - Select table B

LUTB2FLG (Bit3) -- 00 - Linear mode; 01 - Knee mode (for table B)

LUTB1FLG (Bit2) -- 10 - Gamma mode; 11 - Direct input mode (reserved)

LUTA2FLG (Bit1) -- 00 - Linear mode; 01 - Knee mode (for table A)

LUTA1FLG (Bit0) -- 10 - Gamma mode; 11 - Direct input mode (reserved)



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